

Safeguarding Quality
THE PRODUCTION OF A SLEEVE
Retail Sales Manager's Film Service

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One in a series of original filmstrips preserved for their historical value and presented to the members of the [Willys Overland Knight Registry](#)

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Safeguarding Quality
**THE PRODUCTION
OF A SLEEVE**

Retail Sales Manager's Film Service

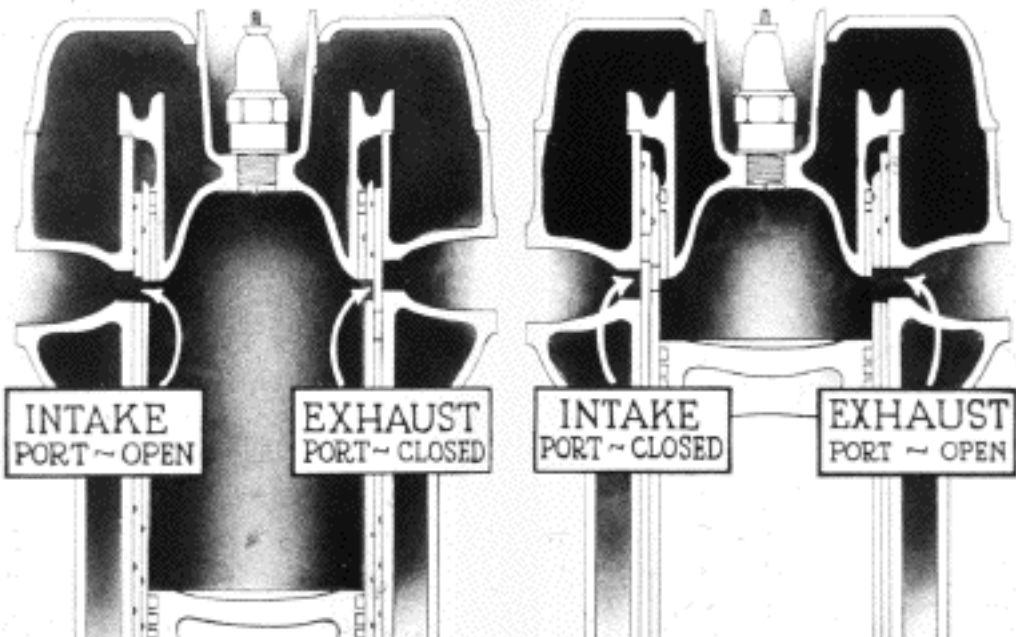
In the Willys-Knight engine the sleeve valve principle in itself insures quiet smooth operation — but add to that principle, care and precision in manufacture and the result is —

OUTSTANDING QUALITY

This pair of sleeves fitted inside the cylinder
of a Knight engine-



Provides positive and accurate control of the incoming and exhaust gases.



Before a sleeve has passed final inspection for insertion in an engine it passes through the hands of a large corps of expert mechanics skilled in the production of sleeves that are true to specifications in every detail of size, shape and finish.

In the foundry the sleeves are cast 6 at a time.



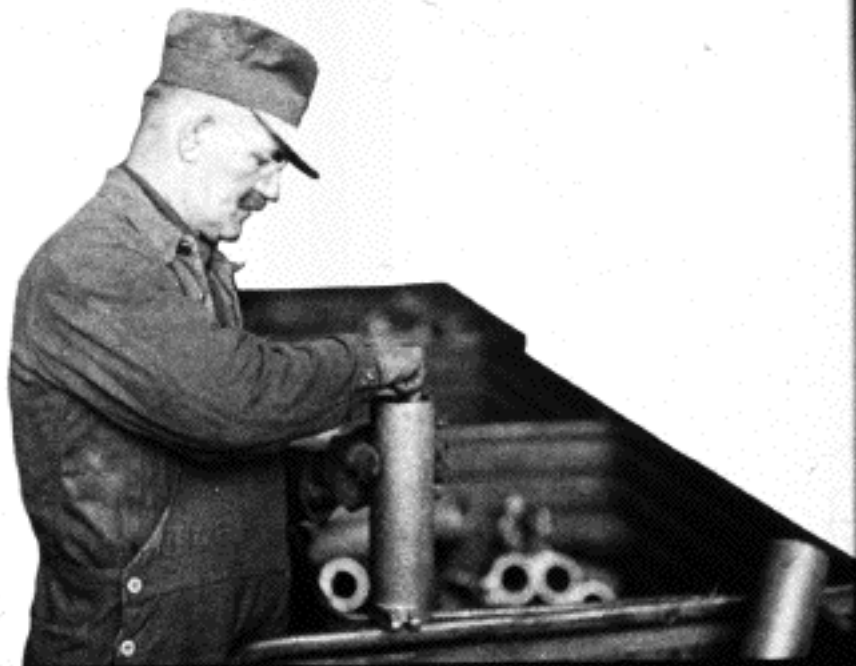
They come to the machine shop in the form
of a rough casting where - -



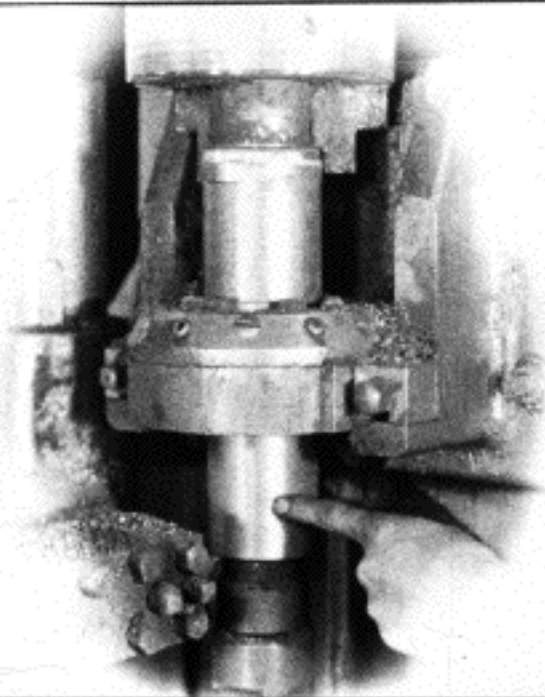
Huge boring machines smooth the inside surface.



Following this first rough boring operation the sleeve is inspected and tested for proper diameter and passed to - -



-- the first turning operation where the outside surface is cut smooth.



In order to relieve any strains that may have been set up in the original cooling of the casting each sleeve is subjected to an annealing process.

They are placed in an oven where the temperature is gradually increased to 800° Fahrenheit.

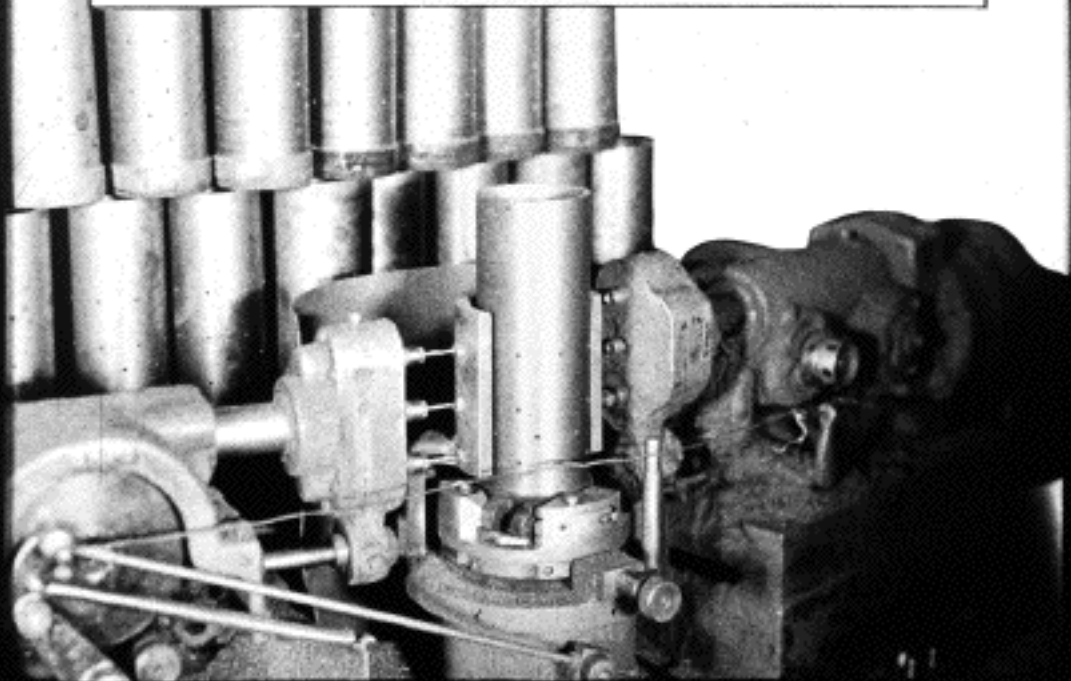


This intense heat is maintained for a period of time after which the sleeves are gradually cooled before they are removed from the furnace.

Following the annealing process the sleeve goes through a semi-finish reaming operation which straightens up the inside bore.

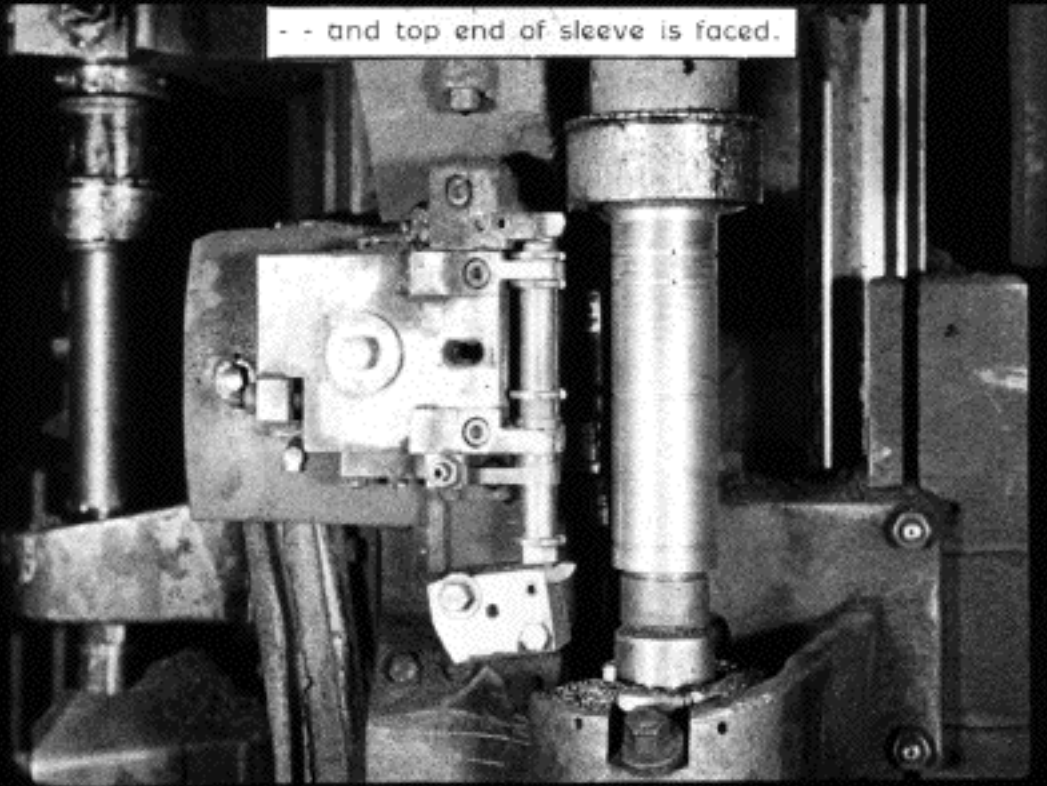


Thirty-two oil holes are bored in the outer sleeves in one operation after which all sleeves pass to - -



— the semi-finish turning operation where the outside surface receives a finer cut in preparation for finishing. Oil grooves are cut —

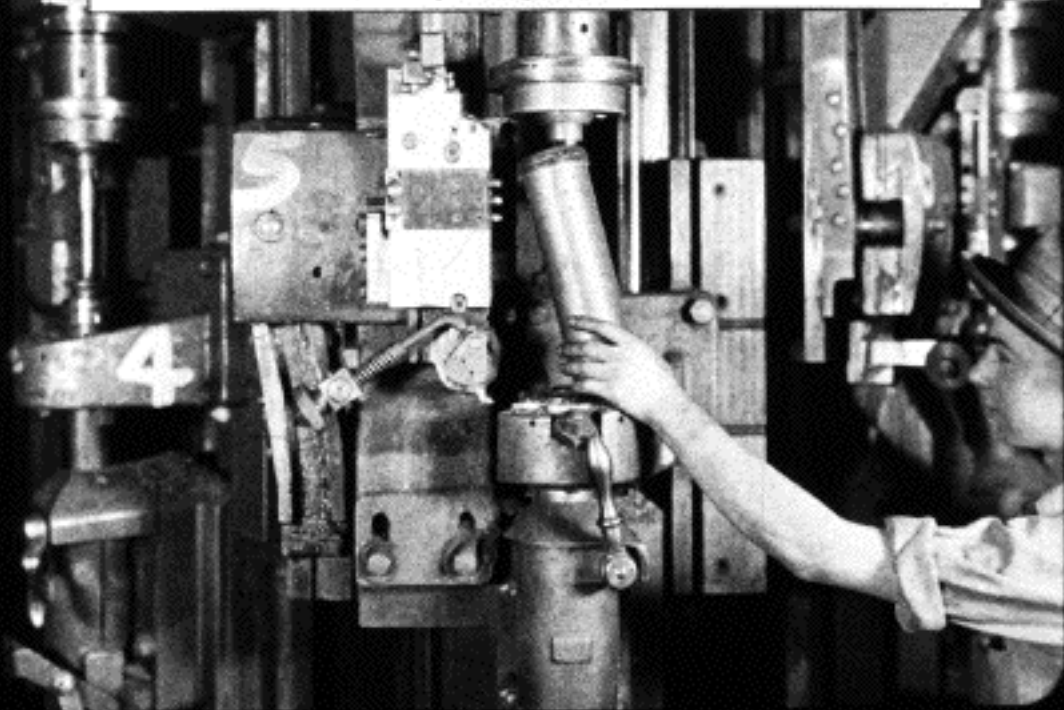
- - and top end of sleeve is faced.



On the next machine the lug is machined.

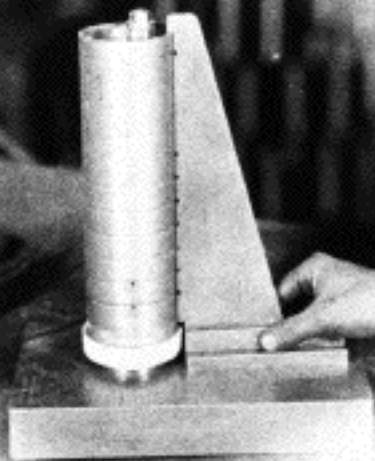


A third and final cut brings the outside surface down to a smooth cut finish, ready for grinding.

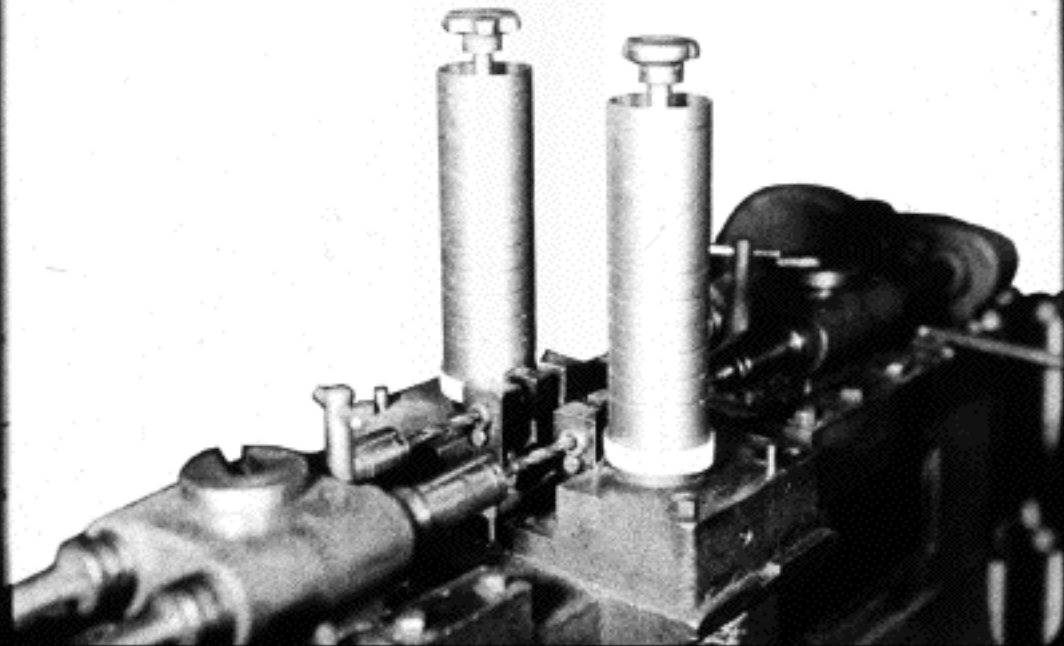


At this point the sleeve is subjected to a rigid examination. The outside diameter is checked at four different points, gauges are inserted at each end to check inside measurements, the depth and relative position of all oil grooves are checked —

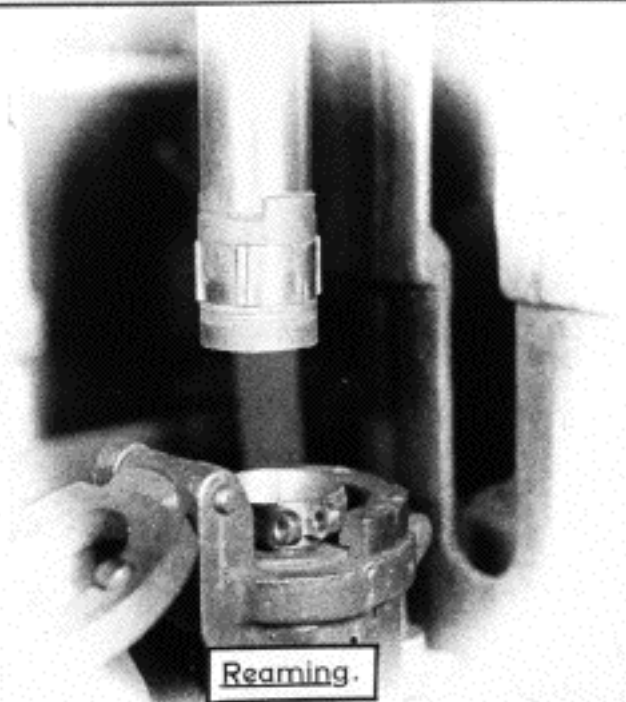
-- the length of the sleeve is measured and all surfaces thoroughly inspected.



Holes are drilled and reamed in the lug for connection with sleeve rods before - -

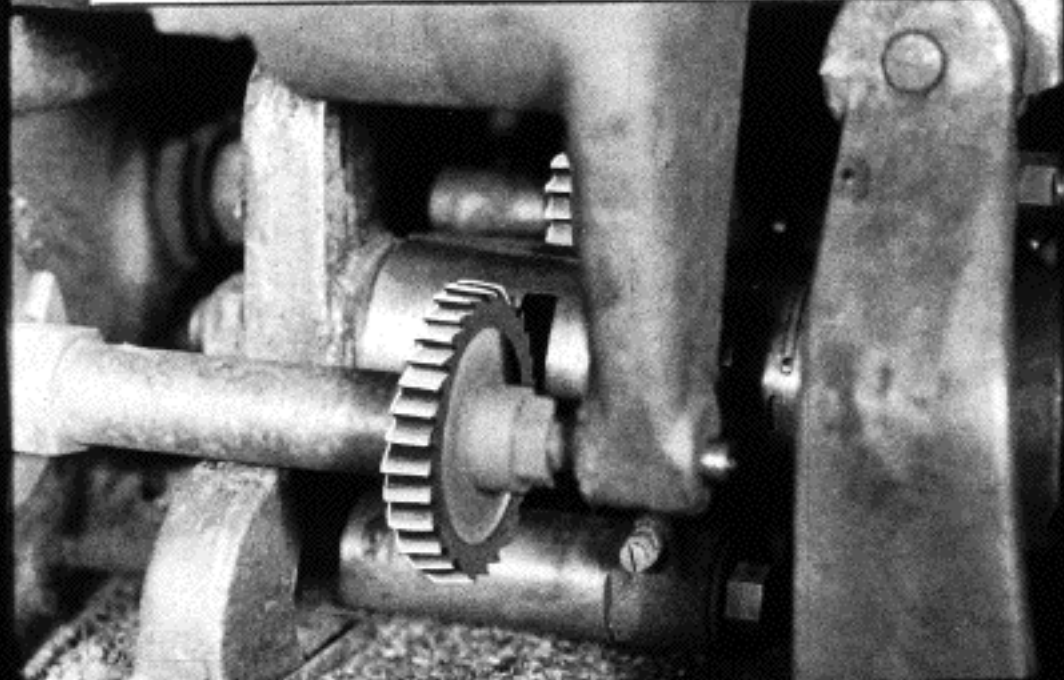


- - the inside surface comes in for further treatment.



Reaming.

The intake and exhaust port holes are both cut at one operation and - -



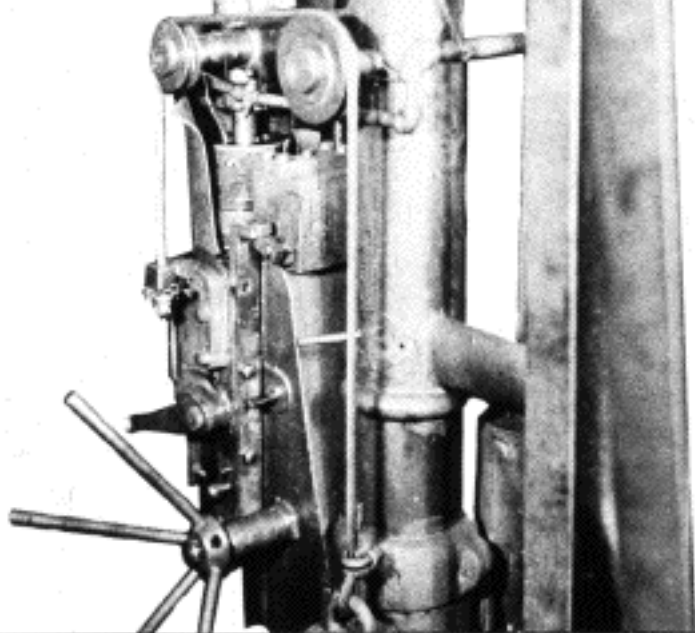
A series of fine corrugations are cut around the outside of the exhaust port to accumulate carbon.



Carbon improves the power of a Knight Engine.

The inside surface of the sleeve which has been bored and twice reamed to a fine finish is now honed with a series of wet honing stones which produce —

- - a glass-like finish.



Such quality details as this perfectly smooth surface make for smooth performance, long life and efficient power.

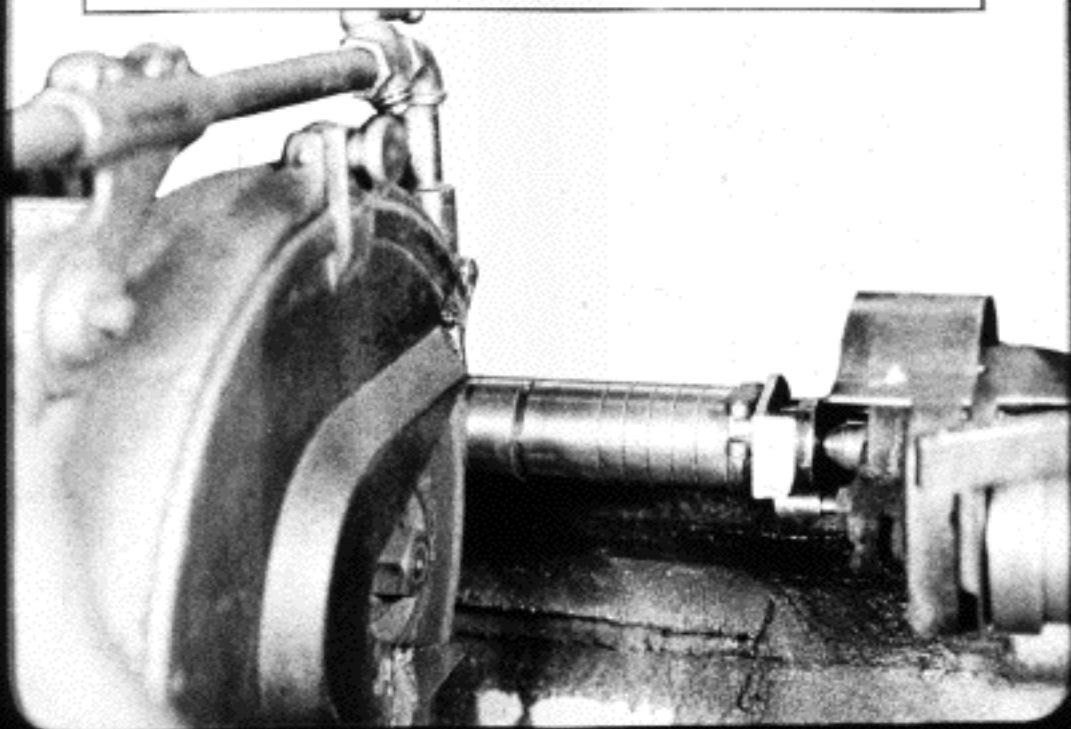
Another rigid inspection at this stage insures proper location of ports - -



— proper dimensions and alignment of sleeve rod lug and alignment of the bore. The inside diameter of the sleeve must not vary $5/10,000$ of an inch or $1/4$ the thickness of the average human hair if it is to pass the inspection.

THESE STANDARDS
MAKE
QUALITY
MERCHANDISE

The outside surface has had three cutting operations each finer than the last before receiving this semi-finish grind.

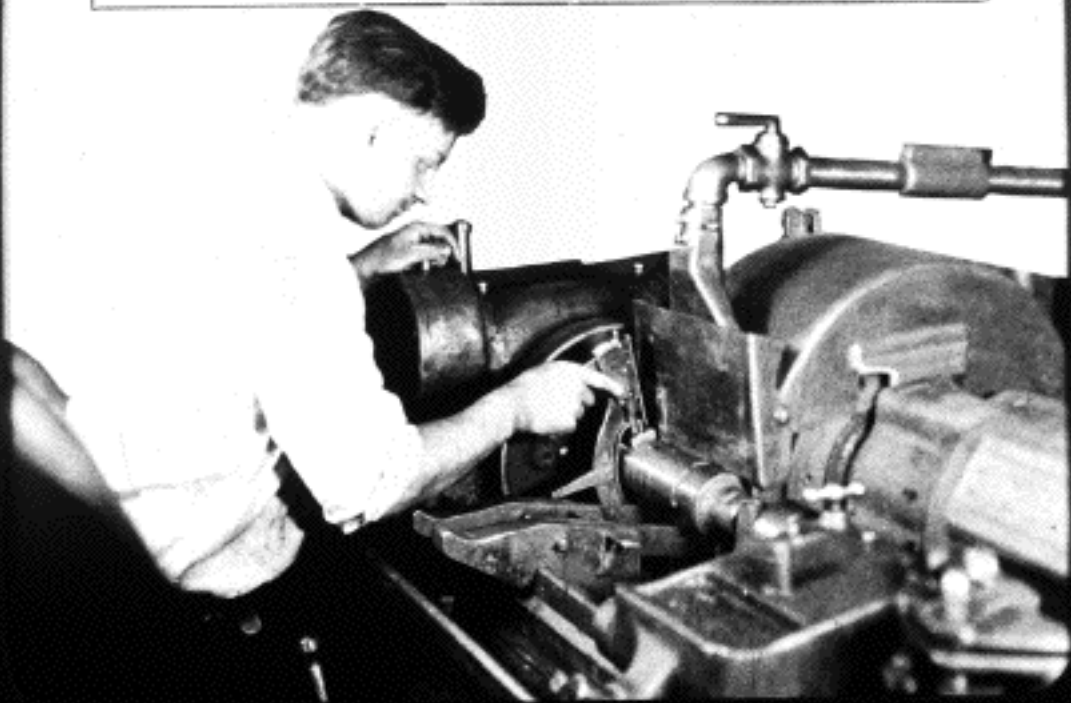


Again in the finish grind we find an operation of extreme accuracy.

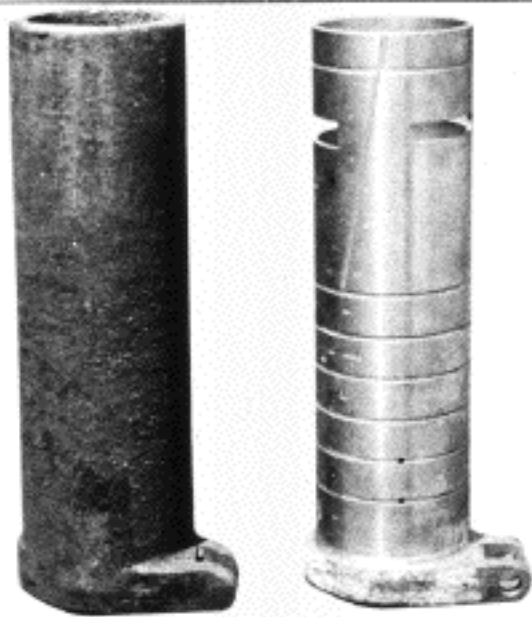


The broad surface of the stone grinds the entire length of the sleeve in one operation. After grinding, the stone is dressed with a diamond stone dresser to insure a perfectly round and smooth surface.

Constant checking with a gauge is essential to the accuracy of this finished surface.



The sleeve has passed through many operations at the hands of skilled machinists in its evolution from a rough casting.



It is now ready for final inspection.

If the sleeve is not perfectly round these gauges say so.



After checking four or five sleeves the inspector checks his gauges with a standard true cylinder.

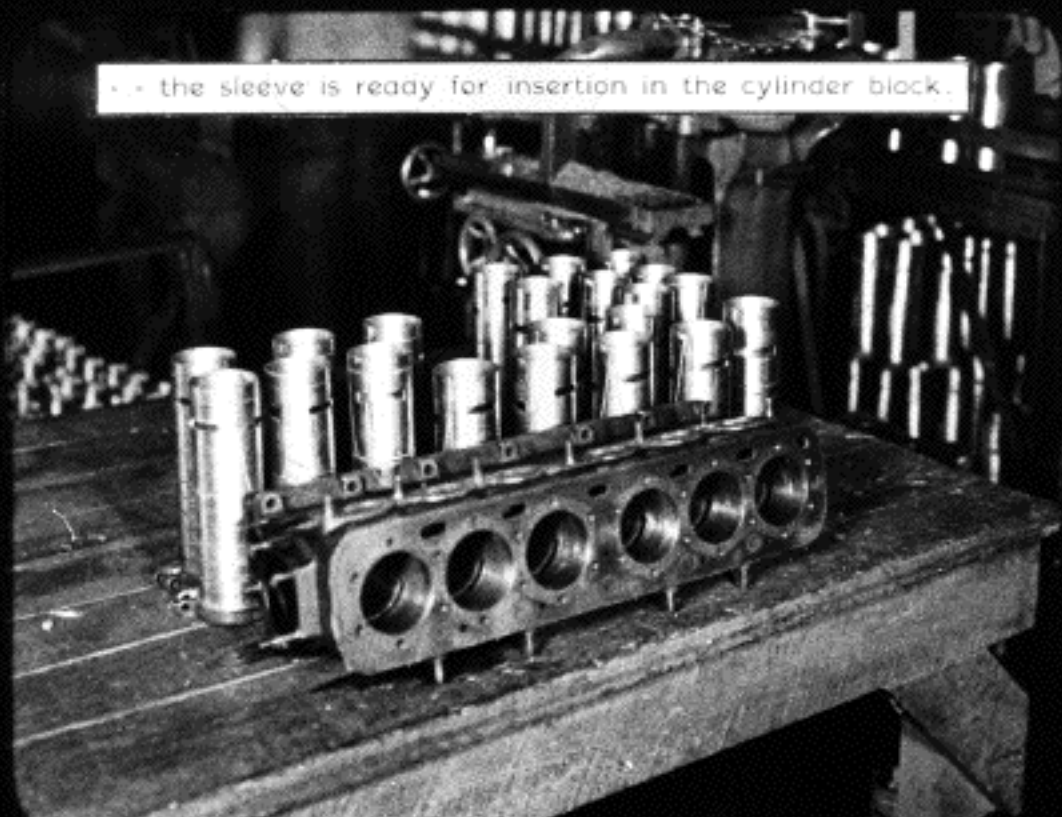


All surfaces are carefully scrutinized for the slightest blemish.



Diameter, length, thickness and alignment all come in for their share of attention. Edges of ports, oil grooves, holes and slots, alignment, size and finish of sleeve rod lug and bevel of the ends are all carefully examined, and checked against specifications before —

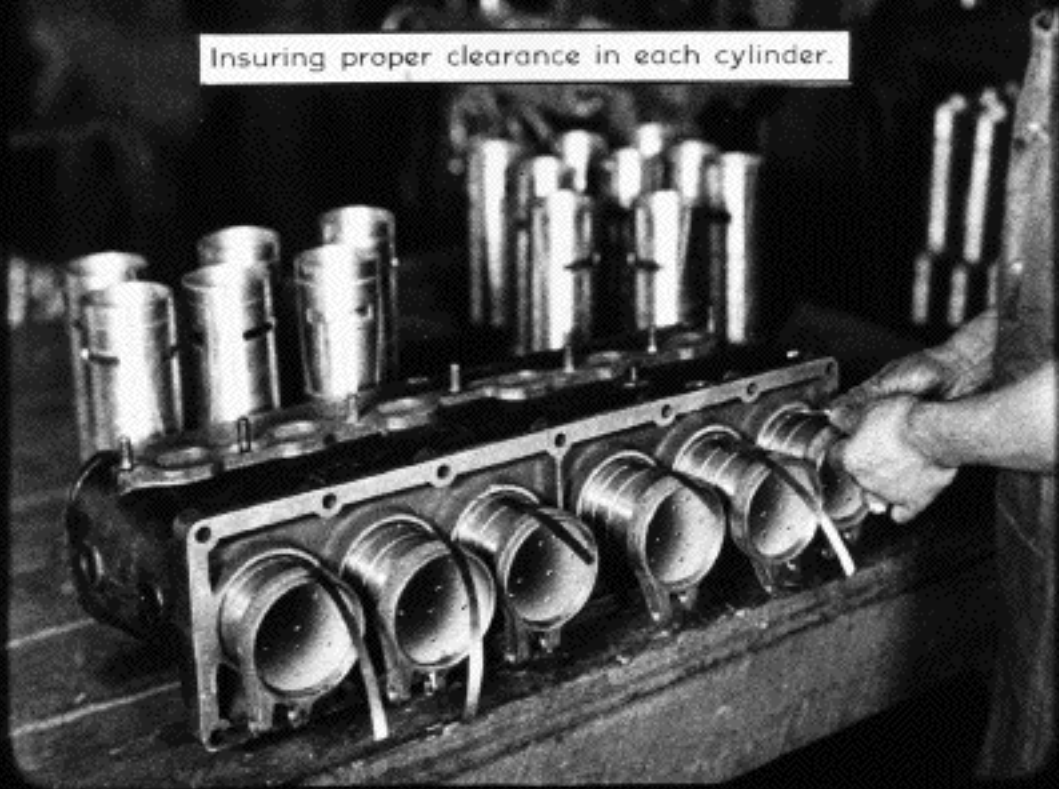
... the sleeve is ready for insertion in the cylinder block.



All sleeves are fitted by hand.



Insuring proper clearance in each cylinder.



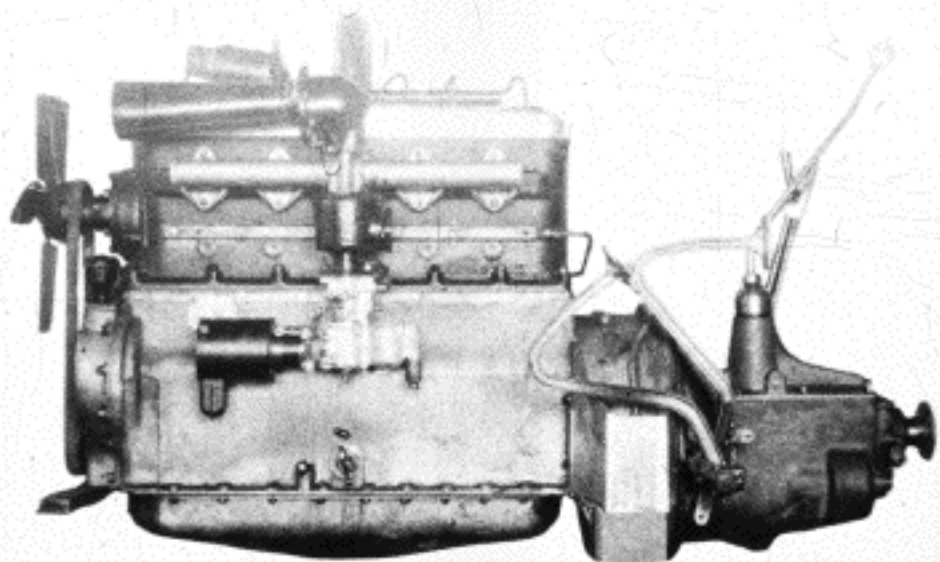
Again we find an inspector checking the clearance and free operation of all sleeves before - -



-- they are ready to install the pistons.



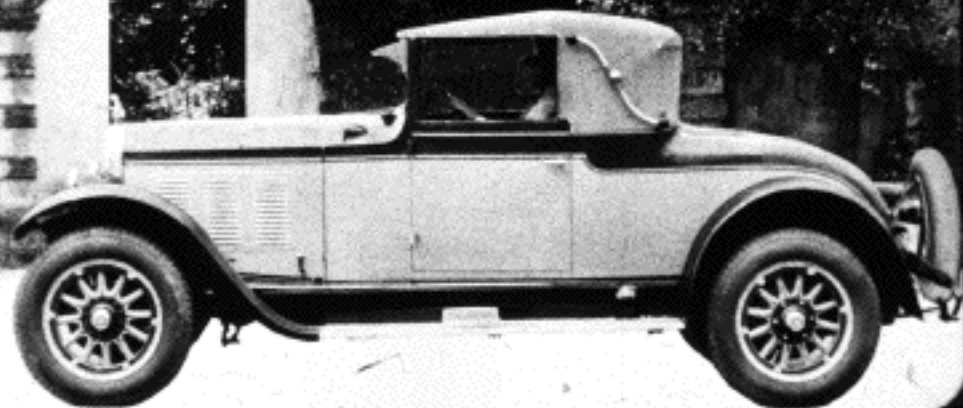
Thus when this Willys-Knight Engine is delivered to you - -



- - you are assured of long life, smooth, silent operation, extraordinary power and quality performance throughout.



The Willlys-Knight sleeve valve engine has from 118 to 158 less parts than any other type of engine.



There are no tappets, no springs, no rocker arms, no pounding of metal upon metal. The hammering of cams against push rods, the contact of push rods on rocker arms, the recoil of valves under coiled springs that cause noise and vibration.

ALL ARE
ELIMINATED!

The Willlys-Knight sleeve valve engine is simplicity itself and therefore permits of finer workmanship and greater quality in detail of manufacture.



FOR THOSE WHO WANT THE FINEST



The
End